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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/820,149	03/28/2001	Katsuhisa Yuda	NEC WNZ-2310	3988

7590

03/09/2004

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EXAMINER

CROWELL, ANNA M

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 03/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary	Application No. 09/820,149	Applicant(s) YUDA ET AL.	
	Examiner Michelle Crowell	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above claim(s) See Continuation Sheet is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continuation of Disposition of Claims: Claims withdrawn from consideration are
3,6,9,12,15,18,19,21,24,27,30,33,36,39,42,45 and 47-51.

Continuation of Disposition of Claims: Claims rejected are
1,2,4,5,7,8,10,11,13,14,16,17,20,22,23,25,26,28,29,31,32,34,35,37,38,40,41,43,44 and 46.

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 4, 11, 13, 14, 16, 23, 25, 26, 28, 35, 37, 38, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuda (Japanese Patent Publication 11-168094).

Referring to Drawings 8-10 and paragraphs [0040]-[0043], Yuda discloses a remote plasma chemical vapor deposition apparatus comprising a chamber wall 16 (body), oxygen gas inlet 5 (first inlet), monosilane and inert gas inlets 9, 24 (second inlet), oxygen plasma region 6 (plasma generation region), silicon oxide precursor region 10 (processing

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region), RF impression electrode 1 (energy source), middle mesh plate electrode 26 (plate, closure electrode, gas supplier plenum), and a counter electrode 2 (substrate supporter).

Oxygen gas is supplied to the RF impression electrode and is excited to create oxygen plasma between the RF impression electrode and the middle mesh plate electrode. Monosilane gas and inert gas are supplied to the processing chamber via the middle mesh plate electrode.

Note. With respect to the chamber pressure, it is inherent that the pressure in the plasma generation region 6 is higher than in the processing region 10 to suppress backward flow of the second gas into the plasma generation region because otherwise the gases would not flow downward. As seen in Figure 8, since gas inlet 5 is in the top of the chamber 16 and exhaust 15 is in the bottom of the chamber a pressure drop is created from the top (plasma generation region 6, i.e. higher pressure) to the bottom (processing region 10, i.e. lower pressure) of the chamber which allows the gases from the plasma generation region to flow downward. Additionally, since the exhaust 15 is located in the bottom of the chamber 16 all of the gases will be drawn downward, as indicated by arrows, and not upward, hence the prevention of flow-back phenomenon is achieved.

Moreover, the middle mesh plate electrode 26 divides the chamber 16 into a plasma generation region and processing region. The middle mesh plate electrode further includes several holes 27, 28, 30 (plurality of perforated holes). The oxygen radical holes 27 have a plurality of upper and lower holes which are connected by tube walls. The oxygen radical holes 27 allow oxygen radicals to pass through the middle mesh plate electrode. Monosilane gas and inert gas flow through the monosilane gas nozzle 27 and inert gas nozzle 28 (gas injection holes)

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located in the bottom of the middle mesh plate electrode. A silicon precursor gas 10 is formed when the oxygen radical gas 7 mixes with the monosilane gas 27.

Regarding Claims 11, 14, 23, and 26, the middle mesh plate electrode 26 acts as both a plate and a closure electrode. The middle mesh plate electrode 26 is electrically grounded so that oxygen radicals may flow through the openings.

Regarding Claims 35 and 38, as seen in Figure 8, the distance between the holes is smaller than the distance between the middle mesh plate electrode 26 and the counter electrode 2.

Yuda does not expressly disclose the claimed aperture ratio of not greater than five percent.

However, a prima facie case of obviousness still exists because it would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize the aperture ratio (hole area and plate area) during routine experimentation depending upon, for example, the desired gas flow, and such limitation would not lend patentability to the instant application absent the showing of unexpected results. Finally, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984)).

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4. Claims 5, 7, 8, 10, 17, 20, 22, 29, 31, 32, 34, 41, 43, 44, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuda (Japanese Patent Publication 11-168094) in view of Sameshima et al. (U.S. 5,304,250).

The teachings of Yuda have been discussed above.

Yuda fails to teach the diameter of each hole inside the plate.

Referring to Figure 2 and column 4, lines 15-21, Sameshima teaches a remote plasma chemical vapor deposition apparatus which uses a disk shaped mesh plate 1 (plate, closure electrode) to divide the chamber into a plasma generation chamber 22 and a substrate treatment chamber 21. The disk shaped mesh plate 1 has a plurality of holes 4 and each hole has a diameter of approximately 3 mm. The hole size and number of holes allows plasma to form either a uniform film or etch a large substrate area. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the plate of Yuda with a hole diameter of approximately 3 mm as taught by Sameshima. This would allow plasma to form either a uniform film or etch a large substrate area.

Response to Arguments

5. Applicant's arguments filed January 23, 2004 have been fully considered but they are not persuasive.

Applicant has argued that the Yuda fails to teach a flow-back phenomenon of silane gas into a plasma generation region, or prevention of such a flow-back phenomenon.

However looking at Figure 8, since gas inlet 5 is in the top of the chamber 16 and exhaust 15 is in the bottom of the chamber a pressure drop is created from the top (plasma generation

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region 6, i.e. higher pressure) to the bottom (processing region 10, i.e. lower pressure) of the chamber which allows the gases to flow downward. Additionally, since the exhaust is located in the bottom of the chamber all of the gases will be drawn downward, as indicated by arrows, and not upward, hence the prevention of flow-back phenomenon is achieved.

Applicant has argued that the invention was not created to provide a desired gas flow but rather to prevent an undesired gas flow.

The advantage to optimize the aperture ratio does not have to be the same as the applicant's.

Applicant has argued that Sameshima fails to teach an aperture ratio in terms of suppression of backflow.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Additionally, the Sameshima reference was only used to teach the diameter size of the aperture hole.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (8:00 - 4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571) 272-1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AMC *ame*

Gregory Mills
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